HITACHI

2SC4791

Silicon NPN Bipolar Transistor

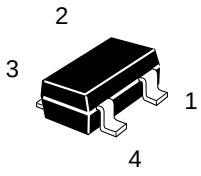
Application

VHF & UHF wide band amplifier

Features

- High gain bandwidth product
  f_T = 10 GHz typ
- High gain, low noise figure
  PG = 15.5 dB typ,
  NF = 1.2 dB typ at f = 900 MHz

MPAK-4



1. Collector
2. Emitter
3. Base
4. Emitter

Table 1 Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	15	V
Collector to emitter voltage	V_{CEO}	8	V
Emitter to base voltage	V_{EBO}	1.5	V
Collector current	I_C	20	mA
Collector power dissipation	P_C	150	mW
Junction temperature	Tj	150	°C
Storage temperature	Tstg	–55 to +150	°C

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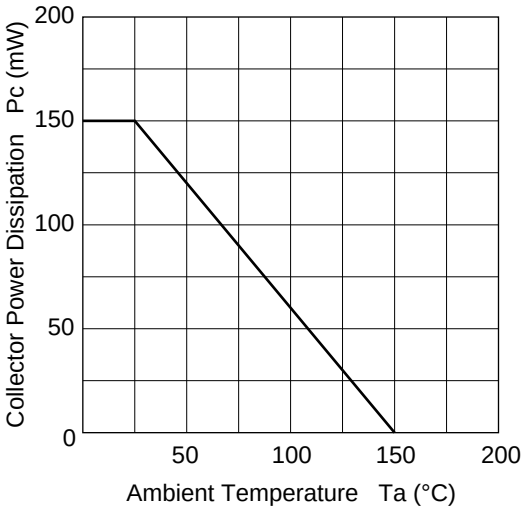
Table 2 Electrical Characteristics (Ta = 25°C)

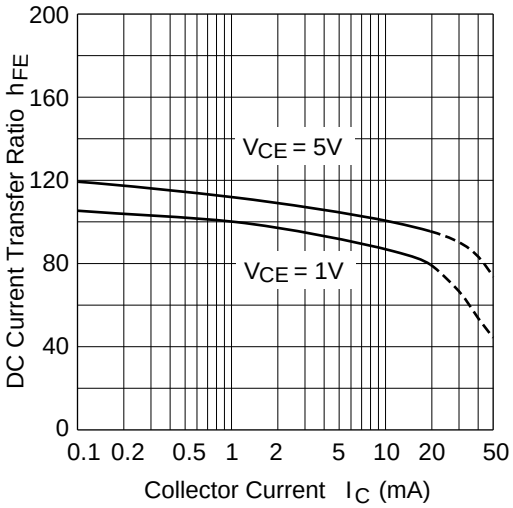
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector cutoff current	I_{CBO}	—	—	10	µA	V_{CB} = 15 V, I_E = 0
	I_{CEO}	—	—	1	mA	V_{CE} = 8 V, R_{BE} = ∞
Emitter cutoff current	I_{EBO}	—	—	10	µA	V_{EB} = 1.5 V, I_C = 0
DC current transfer ratio	h_{FE}	50	120	250	—	V_{CE} = 5 V, I_C = 10 mA
Output capacitance	Cob	—	0.4	0.75	pF	V_{CB} = 5 V, I_E = 0, f = 1 MHz
Gain bandwidth product	f_T	7.0	10.0	—	GHz	V_{CE} = 5 V, I_C = 10 mA
Power gain	PG	12.5	15.5	—	dB	V_{CE} = 5 V, I_C = 10 mA, f = 900 MHz
Noise figure	NF	—	1.2	2.5	dB	V_{CE} = 5 V, I_C = 5 mA, f = 900 MHz

Marking for 2SC4791 is “YA–”.
Attention: This is electrostatic sensitive device.

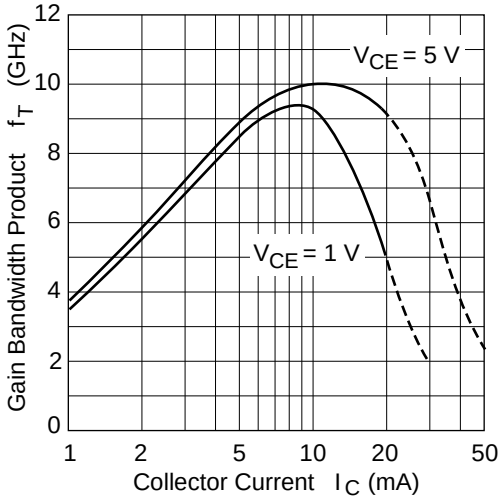
Maximum collector power dissipation curve



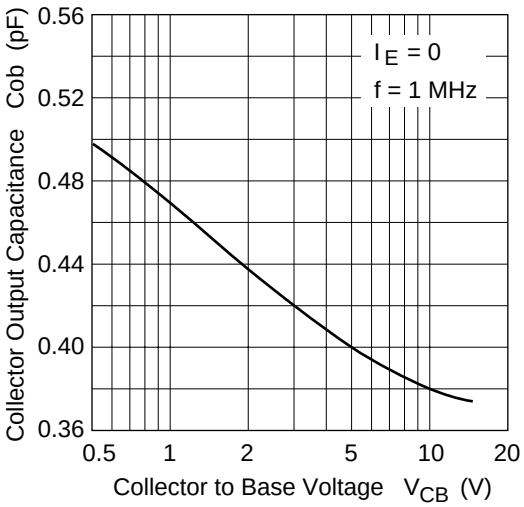
DC current transfer ratio
vs. collector current



Gain bandwidth product vs. collector current



Collector output capacitance
vs. collector to base voltage



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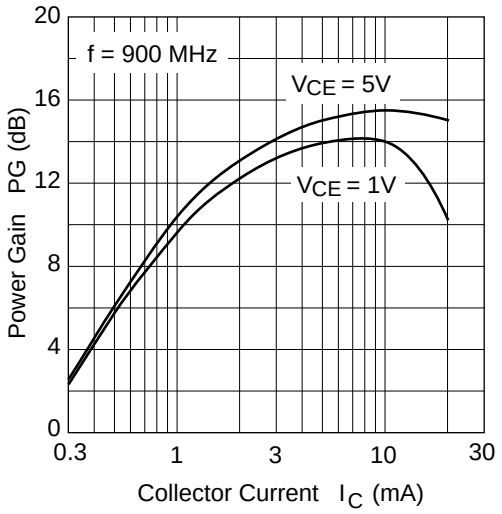
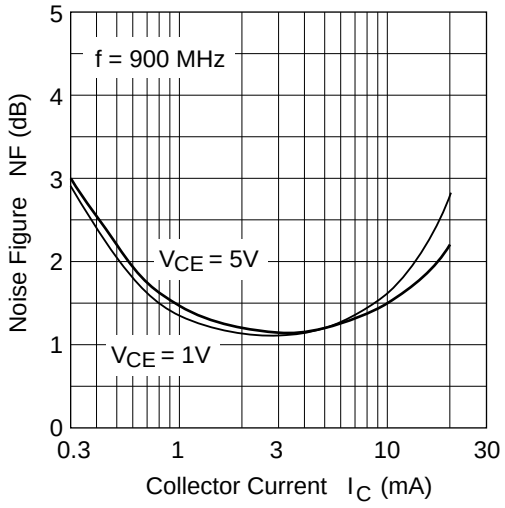
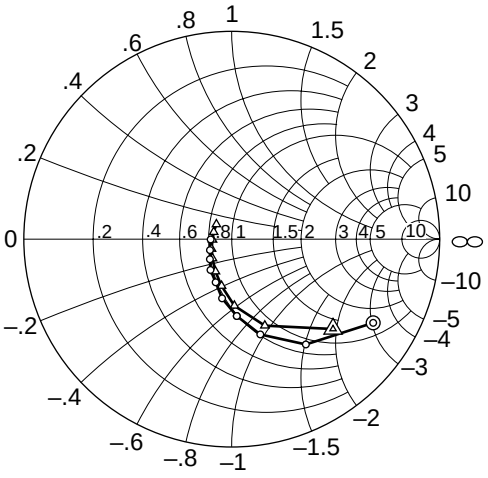
Power gain vs. collector current



Noise figure vs. collector current

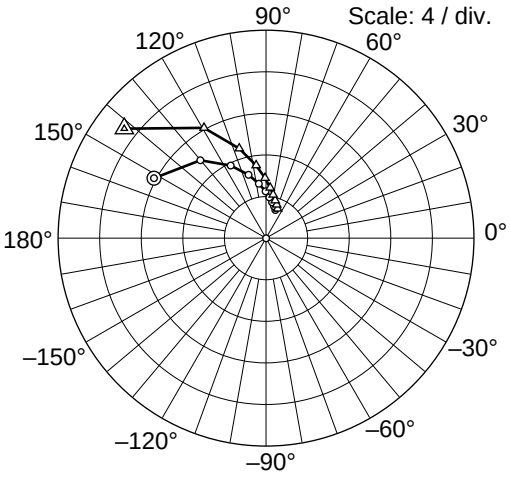


S11 parameter vs. frequency



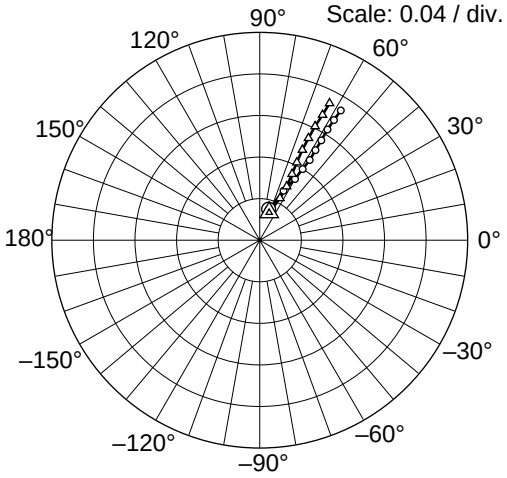
Condition: V_{CE} = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 5 mA)
(I_C = 10 mA)

S21 parameter vs. frequency



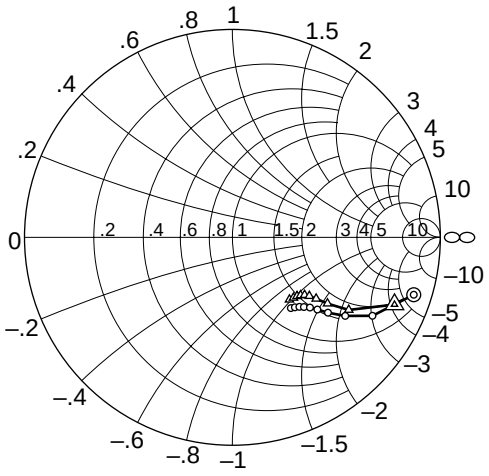
Condition: V_{CE} = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 5 mA)
(I_C = 10 mA)

S12 parameter vs. frequency



Condition: V_{CE} = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 5 mA)
(I_C = 10 mA)

S22 parameter vs. frequency



Condition: V_{CE} = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 5 mA)
(I_C = 10 mA)

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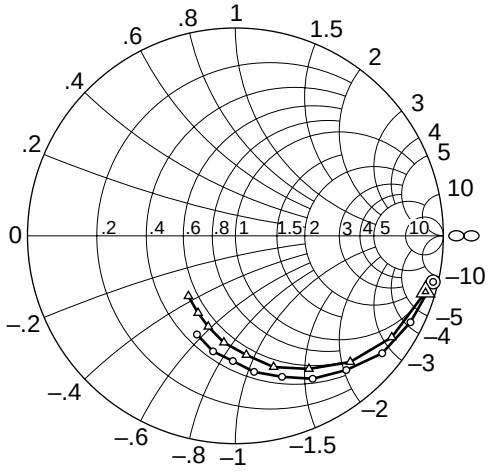
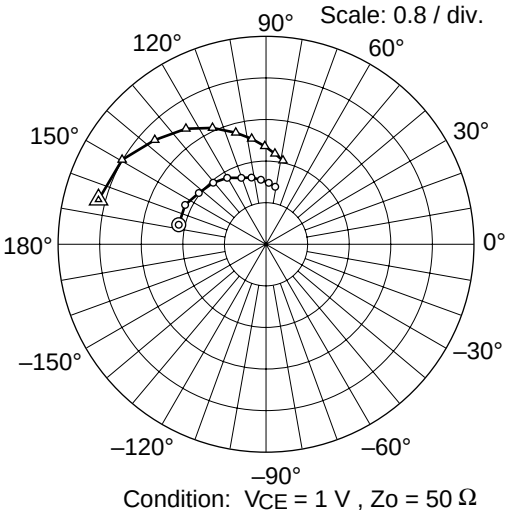
S11 parameter vs. frequency



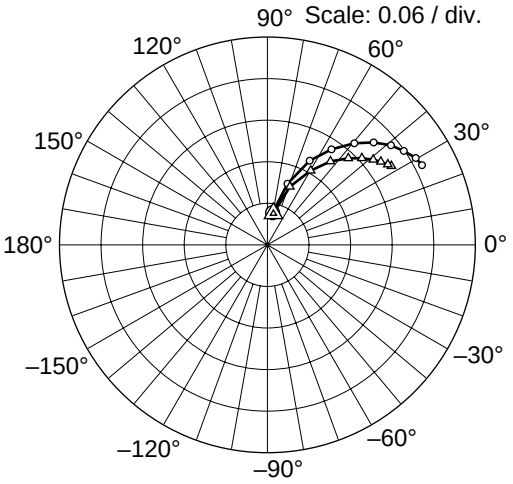
Condition: V_{CE} = 1 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 0.5 mA)
(I_C = 1 mA)

S21 parameter vs. frequency



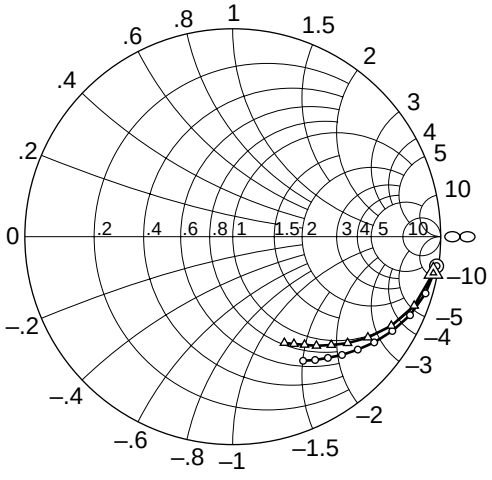
Condition: V_{CE} = 1 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 0.5 mA)
(I_C = 1 mA)

S12 parameter vs. frequency



Condition: V_{CE} = 1 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 0.5 mA)
(I_C = 1 mA)

S22 parameter vs. frequency



Condition: V_{CE} = 1 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 0.5 mA)
(I_C = 1 mA)

Table 3 S Parameter (V_{CE} = 5 V, I_C = 5 mA, Z_O = 50 Ω, Emitter common)

f (MHz)	S11 MAG	ANG	S21 MAG	ANG	S12 MAG	ANG	S22 MAG	ANG
100	0.859	–15.9	13.192	165.5	0.016	82.3	0.974	–9.3
200	0.790	–30.6	12.225	151.9	0.031	73.9	0.914	–17.5
300	0.700	–44.0	10.967	139.9	0.043	68.2	0.841	–24.2
400	0.618	–54.8	9.802	130.2	0.053	64.0	0.771	–29.2
500	0.543	–64.7	8.686	122.4	0.061	61.4	0.710	–32.5
600	0.477	–73.3	7.761	116.0	0.068	59.8	0.660	–34.8
700	0.421	–80.1	6.955	110.2	0.074	58.9	0.619	–36.7
800	0.369	–86.3	6.316	105.5	0.080	58.7	0.584	–38.2
900	0.331	–92.8	5.748	101.0	0.086	58.1	0.557	–39.3
1000	0.287	–99.4	5.275	97.6	0.091	57.9	0.535	–40.3
1100	0.226	–104.8	4.869	94.1	0.097	57.9	0.517	–41.2
1200	0.220	–110.7	4.498	90.6	0.102	58.1	0.502	–42.1
1300	0.200	–110.7	4.169	88.2	0.107	58.4	0.492	–43.1
1400	0.179	–125.0	3.926	85.4	0.113	58.2	0.479	–44.2
1500	0.159	–131.7	3.698	83.0	0.119	58.2	0.471	–44.9
1600	0.142	–138.0	3.493	80.5	0.125	58.4	0.463	–46.0
1700	0.126	–147.6	3.311	78.1	0.130	58.5	0.456	–47.2
1800	0.117	–154.1	3.143	76.1	0.136	58.2	0.450	–48.2
1900	0.109	–166.9	3.008	74.0	0.142	58.0	0.445	–49.3
2000	0.102	179.8	2.864	71.9	0.147	57.9	0.440	–50.4

Table 4 S Parameter (V_{CE} = 5 V, I_C = 10 mA, Z_O = 50 Ω, Emitter common)

f (MHz)	S11 MAG	ANG	S21 MAG	ANG	S12 MAG	ANG	S22 MAG	ANG
100	0.758	–22.4	19.871	159.8	0.015	78.6	0.942	–12.6
200	0.650	–41.5	17.252	142.4	0.028	71.0	0.842	–22.5
300	0.538	–57.1	14.423	129.0	0.037	66.8	0.739	–28.5
400	0.445	–69.1	12.168	119.4	0.045	64.3	0.659	–32.0
500	0.383	–79.6	10.376	112.2	0.052	63.3	0.600	–33.7
600	0.320	–87.8	8.995	106.7	0.058	63.4	0.577	–34.9
700	0.274	–95.4	7.914	101.8	0.065	63.7	0.524	–35.4
800	0.230	–102.4	7.057	97.8	0.071	64.0	0.499	–36.3
900	0.205	–109.8	6.332	93.9	0.076	64.4	0.480	–36.7
1000	0.174	–116.9	5.778	91.0	0.083	64.5	0.466	–37.4
1100	0.154	–125.9	5.291	88.1	0.089	64.6	0.454	–38.0
1200	0.131	–135.1	4.862	85.4	0.096	64.7	0.444	–38.7
1300	0.118	–142.7	4.508	82.9	0.102	64.6	0.438	–39.4
1400	0.108	–154.7	4.226	80.8	0.109	64.5	0.431	–40.4
1500	0.104	–165.2	3.961	78.7	0.116	64.3	0.426	–41.4
1600	0.093	–178.6	3.718	76.4	0.122	64.1	0.420	–42.4
1700	0.095	169.4	3.532	74.3	0.129	64.0	0.417	–43.6
1800	0.094	158.4	3.347	72.4	0.135	63.4	0.413	–44.8
1900	0.094	148.2	3.190	70.5	0.142	63.2	0.409	–46.0
2000	0.101	136.0	3.036	68.6	0.148	63.0	0.406	–47.3

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Table 5 S Parameter (V_{CE} = 1 V, I_C = 0.5 mA, Z_O = 50 Ω, Emitter common)

f (MHz)	S11 MAG	S11 ANG	S21 MAG	S21 ANG	S12 MAG	S12 ANG	S22 MAG	S22 ANG
100	0.983	–6.6	1.757	174.0	0.023	85.8	0.995	–4.1
200	0.976	–13.1	1.723	167.3	0.047	80.7	0.990	–8.2
300	0.961	–19.6	1.741	160.2	0.071	76.4	0.980	–12.3
400	0.938	–26.2	1.734	154.0	0.093	71.9	0.966	–16.4
500	0.920	–32.5	1.666	147.6	0.093	67.6	0.950	–20.1
600	0.903	–38.6	1.629	142.6	0.133	63.4	0.932	–23.9
700	0.868	–44.6	1.584	136.2	0.151	59.9	0.913	–27.3
800	0.836	–50.4	1.564	130.6	0.166	56.2	0.891	–30.6
900	0.819	–56.1	1.520	125.3	0.180	52.8	0.869	–33.8
1000	0.780	–61.6	1.484	120.3	0.193	49.5	0.849	–36.8
1100	0.749	–66.9	1.434	115.3	0.204	46.7	0.828	–39.6
1200	0.713	–71.7	1.369	110.4	0.213	44.0	0.810	–42.1
1300	0.687	–77.0	1.322	107.2	0.221	41.4	0.794	–44.8
1400	0.659	–82.2	1.317	102.3	0.229	38.9	0.774	–47.3
1500	0.629	–86.9	1.282	98.5	0.234	36.7	0.757	–49.7
1600	0.601	–91.2	1.248	94.6	0.239	34.6	0.741	–51.9
1700	0.578	–96.7	1.215	91.0	0.243	32.4	0.726	–54.2
1800	0.656	–101.0	1.187	87.5	0.248	30.4	0.713	–56.3
1900	0.532	–106.3	1.155	84.4	0.249	28.9	0.699	–58.4
2000	0.508	–111.4	1.124	81.0	0.251	27.3	0.686	–60.5

Table 6 S Parameter (V_{CE} = 1 V, I_C = 1 mA, Z_O = 50 Ω, Emitter common)

f (MHz)	S11 MAG	S11 ANG	S21 MAG	S21 ANG	S12 MAG	S12 ANG	S22 MAG	S22 ANG
100	0.969	–8.3	3.406	172.8	0.023	84.7	0.992	–5.3
200	0.953	–16.4	3.337	165.1	0.046	79.1	0.980	–10.3
300	0.927	–25.1	3.270	157.0	0.070	73.7	0.960	–15.8
400	0.896	–33.0	3.218	149.3	0.090	68.8	0.933	–20.8
500	0.860	–40.5	3.068	143.0	0.108	64.2	0.905	–25.1
600	0.820	–47.7	2.950	136.9	0.124	59.7	0.874	–29.3
700	0.778	–54.5	2.816	130.7	0.139	56.3	0.844	–33.2
800	0.731	–61.1	2.711	124.8	0.151	52.9	0.810	–36.7
900	0.703	–67.5	2.580	119.7	0.162	49.8	0.780	–39.9
1000	0.657	–73.8	2.470	114.8	0.171	46.9	0.752	–42.8
1100	0.617	–79.8	2.363	110.2	0.178	44.7	0.725	–45.5
1200	0.575	–84.8	2.229	105.3	0.185	42.5	0.703	–47.7
1300	0.549	–89.8	2.104	102.4	0.191	40.8	0.686	–50.1
1400	0.516	–96.2	2.053	97.9	0.196	38.8	0.660	–52.5
1500	0.485	–101.5	1.975	94.3	0.199	37.6	0.641	–54.5
1600	0.456	–106.7	1.891	90.9	0.203	36.2	0.623	–56.4
1700	0.429	–111.9	1.827	87.8	0.206	34.9	0.607	–58.3
1800	0.412	–115.9	1.751	84.6	0.209	33.7	0.593	–60.3
1900	0.389	–122.6	1.700	81.7	0.211	33.2	0.580	–62.1
2000	0.368	–128.0	1.645	78.8	0.212	32.4	0.567	–64.1